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Equipment Condition Report

Overall Diagnosis
CAUTION

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Machine ID:	**Flag Gangos - Pump 2 - 13" Filter**	Product (h/km):		Lab Sample N°:	**GP899**
Application:	**Hydr system**	Machine (h/km):		Label N°:	
Make/Type:		Filter (h/km):		Equipment Ref. N°:	**LGP662**
Cust. Order N°:		System (l):		Sample Taken:	29/10/2014
Product:	Shell Tellus T 32	Top-up (l):		Sample Received:	03/11/2014

GP899
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Comments Oil Condition:

Visual aspect: dark yellow coloured, clear and bright, with lots of visual foreign matter.
This sample contains traces of water: 181 ppm.
The kinematic viscosity @40°C, 32.23 mm²/s, complies with the mentioned ISO VG32 specification limit.
The kinematic viscosity @50°C is 22.39 mm²/s
The kinematic viscosity @60°C is 16.24 mm²/s
The kinematic viscosity @70°C is 12.22 mm²/s
The kinematic viscosity @100°C is 6.14 mm²/s
The oil's acidity is considered acceptable for this application: 0.44 mgKOH/g.
The ICP spectrometry reveals 14 ppm copper, and traces of iron and tin.

Comments Machine Condition:

The WPC is used to establish a wear baseline because the WPC remains more or less the same from sample to sample over a period of time as long as a machine is operating normally. The current WPC, 13.1 is difficult to diagnose without historical data, but is considered as rather normal for a hydraulic system.
The microscopic evaluation of the ferrogram shows that the ferrous wear primordially consists of small rubbing wear platelets, <15 µm. The larger ferrous wear particles are fatigue flakes with a maximal diameter of 20 µm.
The amount of dark and red ferrous oxides is acceptable.
The non-magnetic wear particles observed are blank metal particles. Their amount is quite notable; their max. size remains limited to 25 µm.
The amount of pollutants is quite notable with mostlyl sand/dust/silt..particles and lube degradation products

Recommendations:

Without historical data it is difficult to give adequate recommendations, but based on current analysis results we consider the overall condition cautiously as "Marginal".
Keep under close observation.
We recommend the efficiency of the system filter is checked.
Ensure representative sampling of the system.

Sample Reported: 06/11/2014 Martine De Neve

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Test Name	Method	Unit	Results
			GP899
PHYSICAL-CHEMICAL ANALYSIS			
Colour	ASTM-D1500	-	**2.5**
Visual appearance	OMS 13882	-	**clear**
Determination of water (KF)	ASTM-D6304	ppm	**181**
Kinematic Viscosity @40°C	ASTM-D445	mm²/s	**32.23**
Kinematic Viscosity @100°C	ASTM-D445	mm²/s	**6.140**
Acid Number (AN)	ASTM-D664	mg KOH/g	**0.44**
ELEMENTAL ANALYSIS			
Aluminium (Al)	ASTM-D5185	ppm	**0**
Barium (Ba)	ASTM-D5185	ppm	**0**
Calcium (Ca)	ASTM-D5185	ppm	**26**
Chromium (Cr)	ASTM-D5185	ppm	**0**
Copper (Cu)	ASTM-D5185	ppm	**14**
Iron (Fe)	ASTM-D5185	ppm	**2**
Magnesium (Mg)	ASTM-D5185	ppm	**19**
Molybdenum (Mo)	ASTM-D5185	ppm	**0**
Sodium (Na)	ASTM-D5185	ppm	**4**
Nickel (Ni)	ASTM-D5185	ppm	**0**
Phosphorus (P)	ASTM-D5185	ppm	**301**
Lead (Pb)	ASTM-D5185	ppm	**0**
Silicon (Si)	ASTM-D5185	ppm	**0**
Tin (Sn)	ASTM-D5185	ppm	**9**
Zinc (Zn)	ASTM-D5185	ppm	**276**
Potassium (K)	ASTM-D5185	ppm	**0**
WEAR INDEX			
Optical density - large	OMS 13875	-	**10.2**
Optical density - small	OMS 13875	-	**2.9**
WPC - Wear Index	OMS 13875	-	**13.1**
% Large particles	OMS 13875	%	**56**
ANALYTICAL FERROGRAPHY			
FERROUS			
Normal rubbing wear (FW-NR)	ASTM-D7690	µm max.	**< 15**
Severe sliding wear (FW-SS)	ASTM-D7690	µm max.	
Abrasive wear (FW-AW)	ASTM-D7690	µm max.	
Fatigue chunks (FW-FC)	ASTM-D7690	µm max.	
Fatigue flakes (FW-FF)	ASTM-D7690	µm max.	**20**
Spheres (FW-S)	ASTM-D7690	µm max.	
Dark oxides index (FW-DOI)	ASTM-D7690	-	**2**
Red oxides - Rust index (FW-ROI)	ASTM-D7690	-	**2**
Corrosive wear (FW-Cor)	ASTM-D7690	µm max.	
Ferrous wear - Severity index (FW-SI)	ASTM-D7690	-	**3**
NON-FERROUS			
White metal alloy wear (NFW-WM)	ASTM-D7690	µm max.	**< 15**
White metal - Severity index (NFW-WMI)	ASTM-D7690	-	**3**
Copper alloy wear (NFW-Cu)	ASTM-D7690	µm max.	
Copper alloy index (NFW-CuI)	ASTM-D7690	-	
Non ferrous - Severity index (NFW-SI)	ASTM-D7690	-	**3**
CONTAMINANTS			
Crystalline particles index (Con-CPI)	ASTM-D7690	-	**3**
Amorphous particle index (Con-API)	ASTM-D7690	-	**1**
Friction polymer severity index (Con-FPI)	ASTM-D7690	-	**3**
Fibres - Severity index (Con-FibI)	ASTM-D7690	-	**1**
Other contaminants index (Con-OCI)	ASTM-D7690	-	**1**
Contamination severity index (Con-SI)	ASTM-D7690	-	**3**

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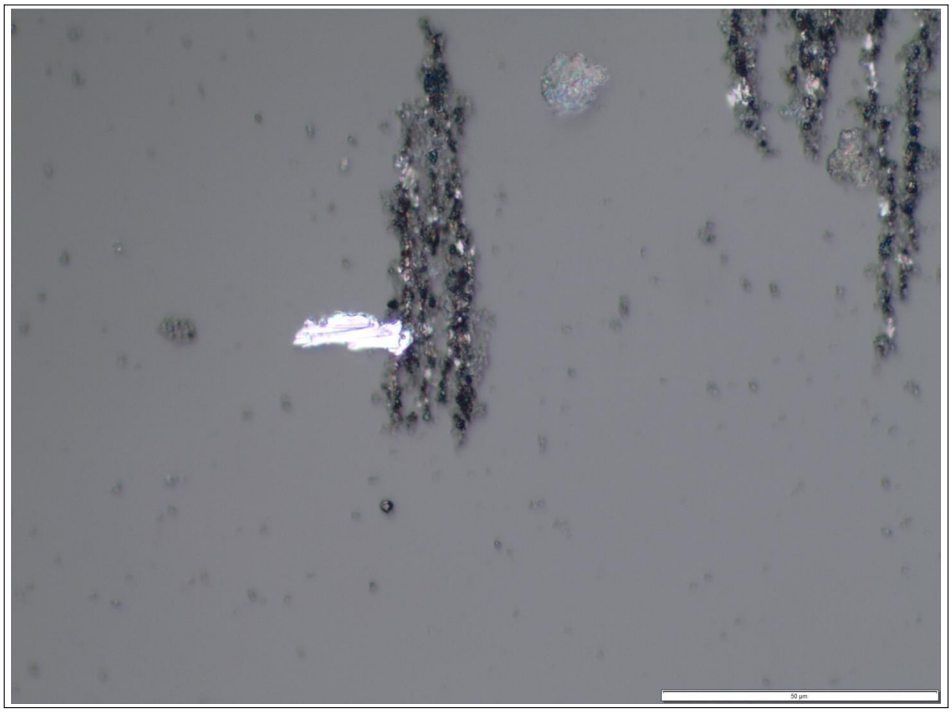

Non-magnetic blank metal particle.